PLATFORM ONE

BIG BANG

Introduction to Big Bang

Learning Objectives

- Describe the Big Bang Product Offering
- Understand the prerequisites to a Big Bang install
- Explain how Big Bang can be consumed

Big Bang - The Team

- Big Bang is a team at Platform One responsible for developing the components of the Big Bang Product, which is basically a way to create and manage instances of the DoD's DevSecOps Platform (DSOP) from a git repo.

- The BigBang team is split into value streams that each focus in on different components of the Big Bang Product.
  - IaC and automation to spin up Kubernetes Clusters
  - Kubernetes YAML IaC and automation that makes up the DevSecOps Platform (DSOP)
  - etc.

Big Bang - The Product

The Big Bang Product is:

- Basically a way to create and manage instances of the DoD's DevSecOps Platform (DSOP) from a git repo.
- Whenever you see a $NAME-bootstrap git repo, that represents an instance of the BigBang Product and an instance of the DevSecOps Platform (DSOP).
- A bundling of VM hardening automation, Provisioning IaC, Kubernetes IaC that makes up DSOP, deployment automation, and documentation.

Rhetorical Questions for Clarification: (covered next slide)

BigBang and DSOP sounds very similar what's the difference?

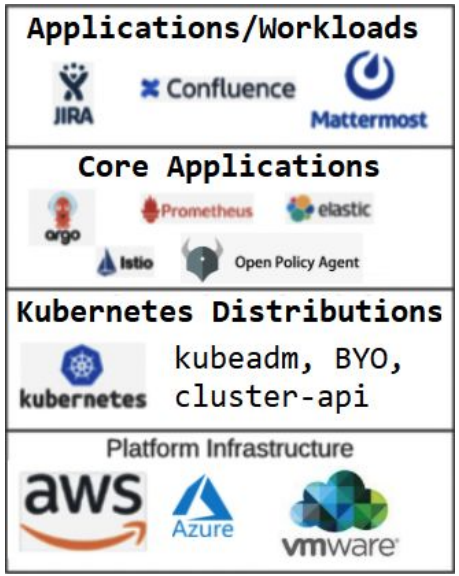
Where does DSOP end and BigBang begin?

Where does DSOP end and BigBang begin?

Top 2 Layers tend to have high reusability of IaC, due to Kubernetes Abstracting Complexity.
Bottom 2 Layers tend to be very specific to the deployment environment

DSOP
Kubernetes YAML

BigBang Product:
$NAME-bootstrap git repo



- **Layer 4** – Applications consumed by the users of the platform.
- **Layer 3** – Set of services to manage and support the platform applications.
- **Layer 2** – Kubernetes distribution for automating computer application deployment, scaling, and management.
- **Layer 1** – Cloud provider or physical hardware for the compute infrastructure.

Components of the BigBang Product

1. IaC and automation for creating hardened VM images.
2. IaC and automation for Provisioning VMs, Cloud Resources, and forming Kubernetes Clusters.
3. DSOP: Kubernetes YAML IaC of Apps that make up the DevSecOps Platform
   - Each app has its own git repo, with documentation, and yaml manifests.
   - bootstrap helm chart:
     - Can generate an ArgoCD App CRD from the manifests in an app's repo
     - Extends the ArgoCD App of Apps concept with multi tenancy
4. Various tools, technologies, and techniques that help package DSOP into a deployable artifact that can be implemented in any environment.

Big Bang - The Product

The Big Bang Product is Offered in 3 ways:

1. BigBang's Paid Product Offering: "Deployment of DSOP as a service"
   Specifically the deployment of the DoD's DevSecOps Platform (DSOP) into a DoD customer's environment. As part of the process a $NAME-bootstrap git repo will be created that will reflect the customer's choice of deployment environment, configuration, and DSOP app selections.

2. PartyBus: "DSOP as a multi-tenant managed service"
   PartyBus is an instance of a BigBang Deployment, that hosts a multi-tenant env, managed by the PartyBus team.

3. BigBang Open Source: "DIY self install of DSOP from open sourced components"
   - You deploy Big Bang on your own and contribute back code/documentation
   - repo1.dsop.io/platform-one/big-bang/bootstraps/bigbang-bootstrap

DSOP - The Components

DSOP Core Apps:

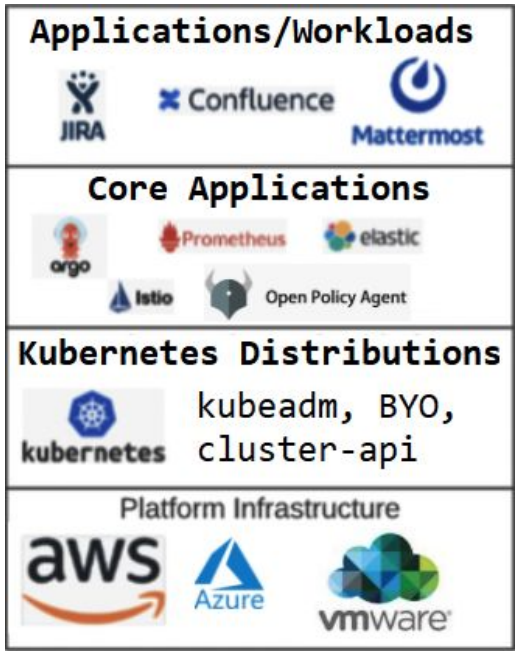
- **ArgoCD:** for GitOps Deployment and Management of Kubernetes IaC
- **OPA Gatekeeper:** for policy enforcement
- **EFK Stack:** Elasticsearch, Fluentd, Kibana for logging
- **Prometheus Operator Stack:** Prometheus, Thanos, Grafana, AlertManager for monitoring and alerting on metrics
- **Istio Stack:** service mesh for network security and network level observability.

DSOP Apps:

- Other Applications can be added from IronBank as needed.
- There's a mixture of open source and licensed apps, so all other apps are opt in.

Big Bang Clusters come in flavors:

The choices that define the flavor are defined in a named-bootstrap git repo



Customer's Choice of Applications:
Can run a single mission app, multiple mission apps, a Software Factory or all of the above.

Applications to be Compliant with DevSecOps Reference Architecture:
Must* run: ArgoCD, Istio, ElasticSearch, Prometheus, OPA Gatekeeper

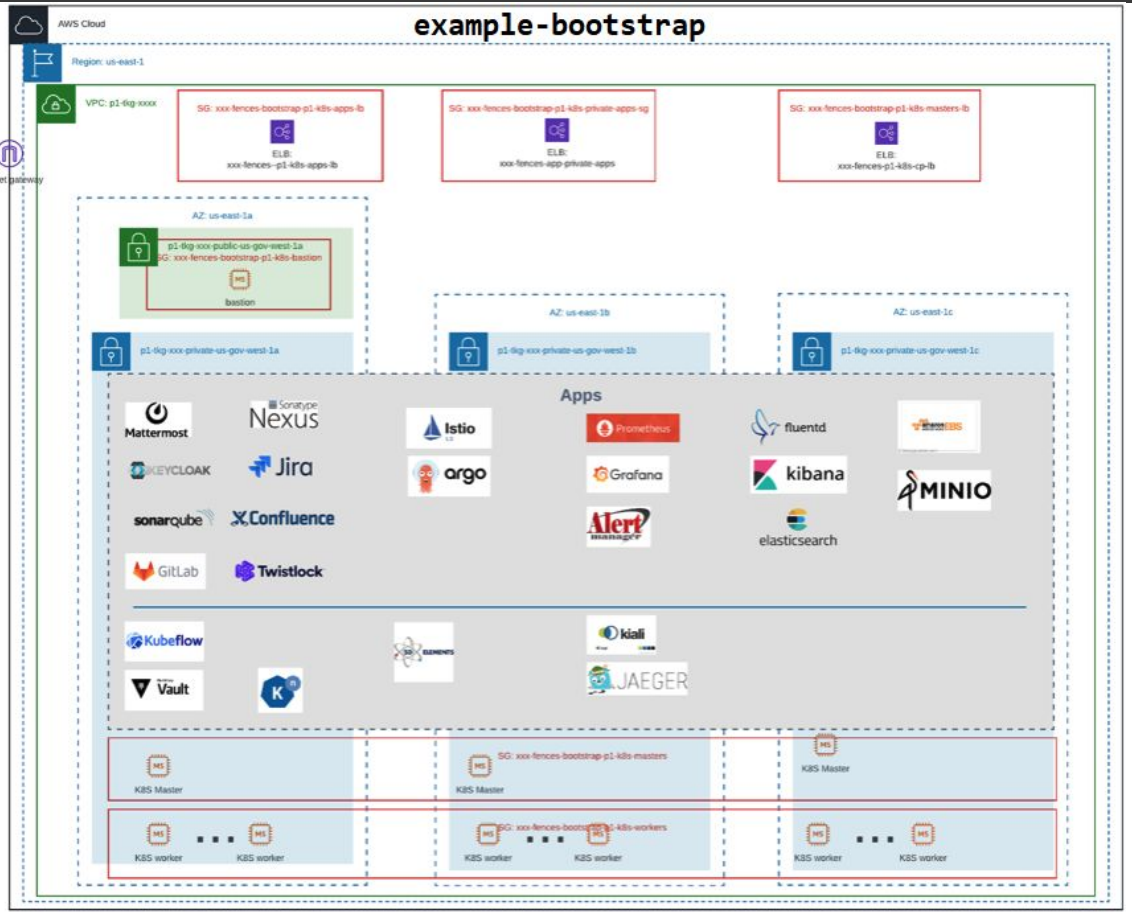
Kubernetes Distribution Installation Options:
"archosaur" (kubeadm), BYO*
Konvoy (Cloud Agnostic Managed Kubernetes Platform)

Cloud Infra Options:
AWS (Stable), VMware (WIP Preview), Azure (Planned)

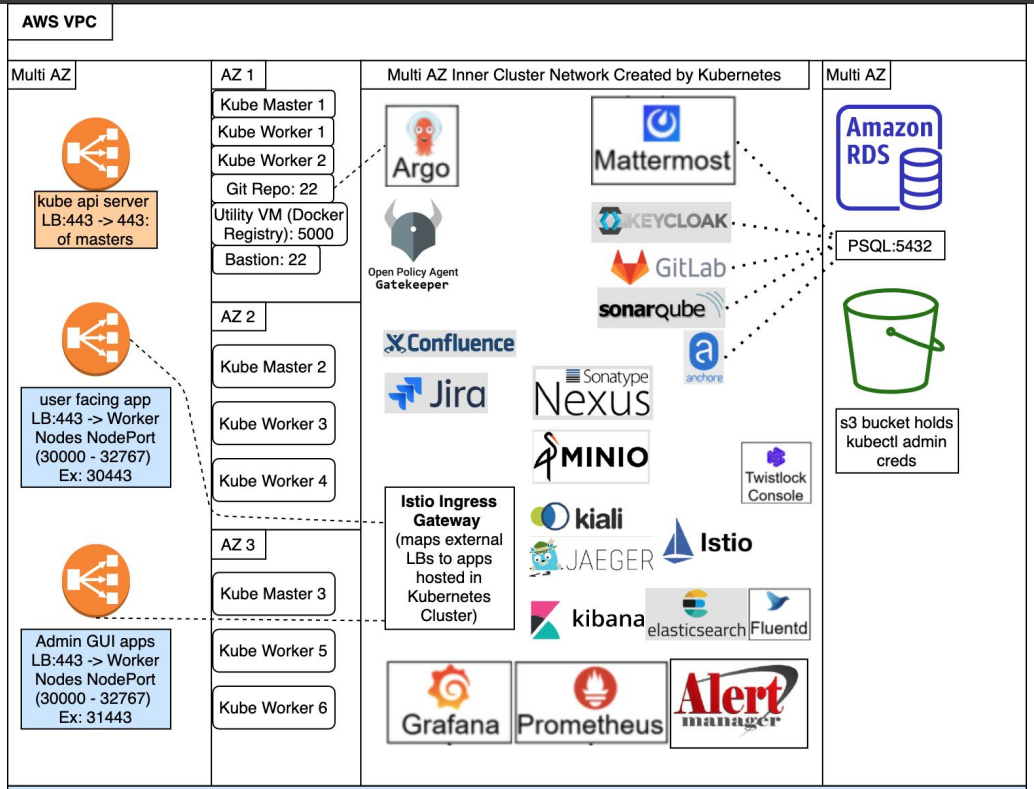
How we install Big Bang

- Step 1: Create a VM image in the environment
- Step 2: Stand up a bootstrap VM in your cloud environment
- Step 3: Use the Bootstrap VM to spin up a BigBang Cluster
- Step 4: Install Git Server
- Step 5: Use the Bootstrap VM Populate Docker Registry
- Step 6: Update IaC/CaC to match the environment.
- Step 7: Install ArgoCD and that will deploy everything else.

Big Bang - The Finished Product



Big Bang - The Finished Product



Notes:
kube api server LB has private IP, the others have private IP by default, but can be set to public.
The Bastion is usually the only server with a public IP.
Kubernetes Workers and Masters pull container images from Docker Registry on Utility VM. ArgoCD deploys apps based on git repo.
Terraform spins up Kubernetes Nodes, Utility VM, RDS, Bastion, an s3 bucket, and security groups, and a few other items like LBs.
Many apps running in the Kubernetes Cluster are complex distributed apps with multiple components, using things like redis, and tons of ports, such ports are only accessible on the Inner Cluster network, not exposed on the LAN.

Questions?

Demo

Demo:

- High-level introduction to the core repository
- Deployment of *-bootstrap cluster w/ GitLab CI/CD.
- Walkthrough of cluster we created